

THE EFFECT OF PINATUBO AEROSOLS ON THE PARTITIONING OF INORGANIC CHLORINE SPECIES

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Enhanced sulfate aerosol levels in the atmosphere resulting from volcanic eruptions lead to reduced concentrations of ozone, particularly in the lower stratosphere at midlatitudes, due to heterogeneous reactions that liberate chlorine from its primary reservoirs, HCl and ClONO₂. There has been considerable debate in the literature regarding the true sensitivity of HCl and ClO to variations in sulfate aerosol loading and how well these sensitivities are understood. This study focuses on quantifying the effect of sulfate aerosols on chlorine partitioning, first by comparing measurements of HCl versus CH₄ obtained by satellite, balloon-borne and aircraft instruments at various times following the eruption of Mt. Pinatubo (data from various platforms are compared by filtering the observations to a narrow range of CH₄ to isolate air parcels with similar levels of Cl_y). We then examine the consistency between theory and observed changes in ClO (aircraft data), ClONO₂ (balloon data), and HCl (aircraft, balloon, and satellite data) to variations in aerosol surface area using data acquired before, during, and after aerosol enhancements due to Pinatubo.